

THURSDAY, JULY 18, 1907.

AN INTRODUCTION TO THE COMPARATIVE ANATOMY OF VERTEBRATES.

Einführung in die Vergleichende Anatomie der Wirbeltiere. By Prof. Robert Wiedersheim. Pp. xxii+471; illustrated. (Jena: Gustav Fischer, 1907.) Price 11 marks.

THE fatalities which may overtake standard text-books are numerous and complex in their action, but on the whole overgrowth, the result of repeated editions, is one of the commonest causes of extinction. With the incorporation of new material in each edition, the scientific merit of a work may rise, but unfortunately its commercial value will certainly decline; from an examination book with a wide circulation amongst students it becomes a reference book, used only by experts. This is a difficulty which faces every author in the preparation of a new edition of a standard text-book; he may do his duty at the expense of circulation, or he may throw overboard older work to make room for the new, and thus maintain or even increase the circulation, or he may do as Prof. Wiedersheim has done—allow the work to increase with the growth of knowledge, and issue another book altogether, into which are condensed the merits and essentials of the older work.

The volume under review is a condensation of Prof. Wiedersheim's well-known text-book on comparative anatomy. It will be widely used, no doubt, by medical and by science students in Germany, but it will also prove of the greatest service to those who wish to obtain a summary of our modern knowledge of this subject. The author has the incomparable advantage of a first-hand knowledge of the whole length and breadth of vertebrate anatomy; as colleagues and advisers in the University of Freiburg he has Gaupp, Keibel, and E. Fischer, each eminent in his own field of work. He possesses a simple, easy diction, a judicious eye for the selection of his facts, and a very open mind. His attitude perhaps is too cautious, too non-committal; difficult and unsettled problems are simply mentioned or brushed aside.

It is a curious fact that no British anatomist has ever produced a systematic treatise on comparative anatomy of the type so common in Germany—the type best represented by the works of Gegenbaur and Wiedersheim. Huxley's classical work on vertebrate comparative anatomy is arranged on quite different lines; there the anatomical facts are so grouped as to throw light on the relationship of one class of animals to another; clearly, in Huxley's opinion, the chief object of the anatomist is to ascertain the evolutionary history of the animal, whereas the German anatomist seeks the evolutionary history of the organ. English anatomists set their facts under a zoological classification, whereas, in the book under review, the classification is strictly anatomical. Prof. Wiedersheim may make incidental allusions to the bearing of a fact on the position of one group of animals to another—such as the impossibility of deriving the mammalian lung

from the reptilian—but such allusions are few and far between. Clearly he has no immediate object in view saving that of bringing together in an orderly arrangement all that is known of the form and variation of each organ. Strictly speaking, the classification adopted in German works on comparative anatomy is essentially physiological; the structures subserving circulation are dealt with in one chapter, those of respiration in another, and it may be at once admitted that this method of classification has an overwhelming advantage over any other. Yet such a treatise is the last one in the world one would consult for physiological information, because the correlation between function and form has never appealed very strongly to the German anatomist. As knowledge increases, it becomes more and more certain that the key to comparative anatomy is comparative physiology—a subject yet in its infancy.

This statement, however, is less true of Prof. Wiedersheim than of his compeers; one rejoices to see occasional allusion to function in his work; he rightly describes the functional significance of the air sacs attached to the lungs of birds; his allusion to the function of the accessory sexual organs will probably assist the student to understand their structure and relationship; mention is made of the effects of the substance secreted by the suprarenal body in raising the arterial blood-pressure, although nothing is said of its equally important action on the musculature of the alimentary canal. There is a frank, engaging honesty in the manner with which Prof. Wiedersheim deals with structures of obscure meaning. As regards the descent of the testicle, he says it is a "schwer erklärbare Vorgang"; unlike Metschnikoff, he does not conclude that the hymen at the entrance of the vagina has neither function nor meaning, because in the present state of our ignorance regarding sexual organs generally we have not as yet discovered any function or meaning attached to it. He frankly admits that the significance of the abdominal pores is unknown. On the other hand, he concludes that the lobulation of the lung has no physiological significance—an inference which will not be supported by a closer knowledge of the mechanism of respiration.

There are certain minor blemishes in this work. The index is not nearly full enough. For instance, on taking the book up for the first time, the reviewer wished to ascertain what was taught regarding the fate of the cloaca in higher mammals, but found no reference to that structure in the index. But in the text he discovered, from incidental remarks rather than from any special description, that Prof. Wiedersheim regards the anus of the higher mammals as the cloacal orifice, and that the urogenital aperture is a new opening. The research of Dr. F. Wood Jones leads to a diametrically opposite conclusion, namely, that the urogenital orifice is the cloacal orifice, and that the anus is a new opening, and hence the frequent occurrence of *atresia ani* in children. There are other statements, too, with which English anatomists will not agree, such as those regarding the nature of the sternum, the origin and nature of the temporo-maxillary joint, the origin and nature of the diaphragm

the homology of the muscles of the body wall, and the retrograde nature of the appendix vermiformis. These, however, are all contentious matters, which the author purposely has left undiscussed, preferring evidently to state the older view until the truth of the newer has been more firmly established.

A. K.

THE PRINCIPLES AND PRACTICE OF FOOD PRESERVING

Les Industries de la Conservation des Aliments. By X. Rocques. Pp. xi+506. (Paris: Gauthier-Villars, 1906.) Price 12 francs.

M. ROCQUES'S aim in writing the present work has been to explain, for the benefit of manufacturers and others, the scientific principles upon which the preservation of foodstuffs is based.

At first sight it is somewhat curious that in dealing with the problems of food-preservation no large measure of success should have been met with until comparatively recent times. To retain the fruits of the earth against periods of scarcity must always have been a desirable object. Hence such operations as the garnering of grain and the drying and salting of flesh were practised ages ago; but afterwards there was a gap of many centuries—one might almost say from prehistoric times until yesterday—during which no considerable advance was made in devising means of preventing the progress of decay. It was a question of the infinitely little. Against club or sword of human despoilers a man might match club or sword in defence of his store of foodstuffs, but he was very nearly powerless against the microscopic agents of putrefactive change.

Nevertheless, in a groping, tentative sort of way, some steps were beginning to be made during the eighteenth century. On the theoretical side Van Helmont, Boyle, Becher, Pringle, Macbride, Black, and others studied the allied questions of fermentation and putrefaction, whilst Lavoisier gave the first touches of quantitative exactitude to such inquiries by his experiments upon the alcoholic fermentation of sugar. On the practical side Gaefer and Eisen tested the possibility of preserving vegetables and fruits by desiccation. Then in the early part of last century came Appert, who practised what is essentially the process of sterilisation employed at the present day on an immense scale in the preservation of every sort of comestible. But it was only with the victory of Pasteur in his famous controversy with Liebig that the true nature of fermentative and putrefactive change became clear. It was the micro-organism, and not the air (*per se*), nor spontaneous generation, nor chemical instability, that was responsible for the decay of organic tissues. Henceforward the steps become firm. It is now the aim of all preservative processes to prevent the development of the micro-organism, whether by exclusion of its presence, or by its destruction, or by the inhibition of its growth. Hence it is that either heat or cold may be used for the required purpose: canned peaches are edible because the putrefactive organisms had been destroyed by heating; ice-embedded mastodons, ages after their death, have furnished well-preserved carcasses because

the development of micro-organisms has been inhibited by cold.

After touching upon these and other points in an interesting historical sketch, the author deals, shortly but comprehensively, with the phenomena and products of putrefactive change in alimentary substances. He passes then to the consideration of the practical processes employed in preventing these changes. Preservation by means of heat is first described. To give an idea of the general plan of the book we will outline this section. First comes a sketch of the development of the industry, with notes of localities, products, and some statistics of production—not very recent, by the bye—then the general technique is described, including the manufacture of tins and bottles, and the different methods of closing and sterilising these vessels after they are filled. Afterwards the various classes of foods—vegetables, fruits, meat, fish, and milk—are dealt with in detail, the quantity of material, preliminary treatment, and time of sterilisation being given where necessary for each individual article. Numerous illustrations of machinery and operations elucidate the text.

This thorough and practical style of treatment is continued in the remaining sections of the book, dealing respectively with preservation by means of cold, by desiccation, and by the use of antiseptics. M. Rocques laments the fact that France has lagged behind other countries in the use of cold storage, which in the opinion of M. Muntz is the method having the greatest future. In connection with this an interesting parallel may be noted. Just as Lister's antiseptic surgery has been largely replaced by aseptic processes, so in the case of foodstuffs sterilisation by heat is being to a considerable extent obviated by the practical asepsis of refrigeration.

We can cordially endorse the closing words of M. Brouardel's preface: M. Rocques has written a good book and done a good deed at the same time, since in all probability the health of his fellow-men will benefit from using the information he summarises and applying the principles he explains.

C. SIMMONDS.

THE THEORY OF PLANT BREEDING.

Le Transformisme appliqué à l'Agriculture. By Prof. J. Costantin. Pp. 300. (Paris: Alcan, 1906.) Price 6 francs.

BY "transformism" Prof. Costantin understands the passage from one species to another or the creation of new species—Lamarckianism or Darwinism in contradistinction to the older theories of men like Jordan concerning the absolute fixity of species. The book in the main deals with plants, and consists of a general discussion of the meaning of a species and of such phenomena as garden varieties, bud sports, and graft hybrids, the effects of climate and soil on type, together with a summary of the work of de Vries on mutations and of Nilsson and the Svalöf station on the improvement of cereals. It is a difficult and complex country, and as so much of the progress of agriculture must depend on the creation of improved varieties, the importance of a survey of the known